

REMARKS

This is in response to the Office Action dated October 15, 2003. In view of the foregoing amendments and following representations, reconsideration is respectfully requested.

Initially, in response to the objection to the specification set forth on page 2 of the Office Action, a substitute specification and abstract has been prepared to provide a clean copy of the revised specification and to correct the informalities noted by the Examiner.

Next, on pages 2-3 of the Office Action, claims 9 and 14 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 11 and 17 of co-pending application No. 10/018,174. Accordingly, upon the indication of allowable subject matter, a Terminal Disclaimer will be submitted in order to overcome the provisional rejection.

Further, on pages 3-6 of the Office Action, the claims are rejected as follows:

Claims 9 and 10 are rejected under 35 U.S.C. § 102(b) as being anticipated by Dantzig et al. (USPN 4,523,634);

Claims 9-18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kittilsen et al. (USPN 5,915,455); and

Claims 9-11 and 14-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Steen et al. (USPN 5,678,623).

In light of the Examiner's comments on pages 6-9 of the Office Action, the preamble in each of the independent claims has been modified in order to clarify that the claims are limited to horizontal casting equipment.

The present invention is directed to horizontal casting equipment in which gas and oil can be supplied to a horizontal metal mold in a controlled manner. The supply of the gas and oil can be differentiated around the circumference of the cast metal product. Independent claims 9 and 14 each require an arrangement in which primary cooling is provided by heat transfer through the permeable wall material, and secondary cooling is provided by directly supplying coolant into the cavity so as to provide secondary cooling of the metal being cast.

Danzig discloses a process and apparatus for controlling the position of a cast ingot so that distortions of the metal casting are avoided. In the Danzig system, oil is supplied as a lubricant and water is supplied as a coolant. The water is supplied as a uniform curtain on the molten metal. Clearly, Danzig does not disclose an arrangement having primary and secondary cooling zones. The Examiner takes the position that outer mold wall 18 can be considered permeable. However, the fact that a channel(s) can be formed through an impermeable material, does not make the material itself permeable. Describing a material as "permeable", is specifying a property of the material. The Examiner's construction of the term would make the term "impermeable" meaningless since any material could be "permeable to some degree". Furthermore, the claim specifies that the material be permeable to the oil and gas that is supplied to the cavity through the permeable wall material.

Accordingly, it is submitted that each and every limitation of claims 9 and 14 are not met by the Danzig reference, and therefore these claims cannot be anticipated by the Danzig reference under 35 U.S.C. 102(b).

Kittilsen discloses horizontal casting apparatus including a mold 10 having a primary cooling water circuit 11 and a secondary cooling water circuit 12. The mold also has an oil ring 19 for supplying oil to lubricate the mold. Also, a transition ring 21 is formed of insulating porous refractory material. In the Kittilsen apparatus, the metal starts to solidify at point 25 which is downstream of the transition ring 21. A protective gas can be introduced behind or upstream of the transition ring in order to prevent surface discoloration of the ingot. Thus, in Kittilsen the protective gas is provided to the hot top and not to the mold as required in claims 9 and 14. Further, the supply of oil is not provided through the transition ring, and the gas and oil cannot be differentiated around the circumference of the hot top surface.

Further, regarding dependent claims 12 and 17, it is not seen how the Kittlesen reference meets the limitations of these claims. The Kittlesen mold housing does not include a first housing part surrounding said permeable wall material, or a second housing part. Further, Kittlesen does not disclose or suggest a thermally insulating annular plate arranged against the first housing part to reduce the thermal transfer between the mold cavity and an intermediate cooling channel defined by said first and second housing parts and said thermally insulating annular plate.

Steen discloses a "vertical" casting apparatus including means for supplying water, oil and gas. When providing gas in a vertical mold, the gas will float up within the mold and create a ring of gas above the metal. Note, in Steen, the oil is provided prior to the gas. In the present invention, the gas is supplied prior to the oil, i.e. the opposite of that disclosed in Steen. If the teachings of Steen were employed in a horizontal casting

operation, a gas pocket would be created at the top of the mold. In the present invention, the gas is supplied to a horizontal metal mold in the solidification area. In the present invention, as defined in claims 9 and 14, the gas and oil are supplied through separate supply channels, thereby making it possible to differentiate the supply of gas and oil. As demonstrated above, none of the prior art references discloses such an arrangement.

In view of the above, it is submitted that the present invention is now clearly allowable over the prior art of record. Accordingly, the Examiner is requested to enter the above amendments, and pass this application to issue.

In the event that the Examiner has any comments or suggestions of a nature necessary to place this case in condition for allowance, then the Examiner is requested to contact Applicant's undersigned attorney by telephone to promptly resolve any remaining matters.

Respectfully submitted,

Inge JOHANSEN et al.

By: 

Michael S. Huppert
Registration No. 40,268
Attorney for Applicants

MSH/kjf
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
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